IN THE CLAIMS:

Please replace pages 11-15 currently on file in the present application with the enclosed pages 11-15, thereby substituting pending claims 1-19 with new claims 1-19. New claims 1, 8, and 11 correspond to and are an amended form of pending claims 1, 8, and 11, respectively. By this Amendment, claims 1, 8, and 11 are amended, leaving claims 2-7, 9, 10, and 12-19 unchanged. For the Examiner's convenience in identifying the changes hereby made to the claims of the present application, a manuscript copy of the claims of record showing the amendments is enclosed herewith.

CLAIMS

1. A telescoping sub assembly adapted to be coupled between a drill head of a drilling rig and a drill rod, the telescoping sub assembly comprising:

a stator portion coupled to the drill rod and defining a drilling axis;

a rotor portion coupled to the drill head and moveable with respect to the stator portion between a retracted position corresponding to a first drilling depth, and an extended position corresponding to a second drilling depth; and

a locking assembly releasably engaging the stator portion with the rotor portion in an extended state of the telescoping sub assembly via a first mating engagement between the rotor and stator portions in a first relative axial position of the rotor portion with respect to the stator portion; and

the locking assembly releasably engaging the stator portion with the rotor portion in a retracted state of the telescoping sub assembly via a second mating engagement between the rotor and stator portions in a second relative axial position of the rotor portion with respect to the stator portion;

wherein the stator and rotor portions are releasably engaged with one another at the first and second axial locations by relative rotational movement of the rotor portion with respect to the stator portion at the first and second axial locations, respectively, and wherein such engagement of the stator and rotor portions prohibits further relative rotation of the rotor portion with respect to the stator portion.

2. The telescoping sub assembly of claim 1, further comprising a detent assembly including a first portion coupled to the stator portion and a second portion coupled to the rotor portion, the first and second portions engaging one another when the rotor portion is in the retracted and the extended positions.

3. The telescoping sub assembly of claim 2, wherein the first portion includes a pair of axially spaced detent couplings coupled to the stator portion, and the second portion includes a drive dog coupled to the rotor portion, and wherein when the rotor portion is in the retracted position the drive dog detently engages one of the detent couplings, and when the rotor portion is in the extended position, the drive dog detently engages the other of the detent couplings.

4. The telescoping sub assembly of claim 3, wherein each detent coupling defines a plurality of bores, and each bore receives an axially biased detent pin including an end extending axially beyond the detent coupling, and wherein the drive dog defines a plurality of detent recesses that receive the detent pins when the rotor portion is in the extended and retracted positions.

5. The telescoping sub assembly of claim 1, wherein the locking assembly includes a locking plate coupled to the stator and providing a first engagement portion and a second engagement portion axially spaced from the first engagement portion.

6. The telescoping sub assembly of claim 5, wherein the locking assembly includes a drive dog coupled to the rotor portion, the drive dog engaging the first engagement portion when the rotor portion is in the retracted position, and engaging the second engagement portion when the rotor portion is in the extended position, and wherein engagement between the drive dog and the first and second engagement portions transmits rotation from the rotor portion to the stator portion.

7. The telescoping sub assembly of claim 5, wherein the stator portion receives at least a portion of the rotor portion, and wherein the locking plate is received within an annular space defined between the stator portion and the rotor portion.

8. A telescoping sub assembly adapted to be coupled between a drill head of a drilling rig and a drill rod, the telescoping sub assembly comprising:

a generally cylindrical stator housing defining a drilling axis;

a bottom sub coupled to an end of the stator housing and adapted to be coupled to the drill rod;

a generally cylindrical guide member coupled to an opposite end of the stator housing;

a rotor shaft having a first end adapted to be coupled to the drill head, and a second end that is received by the guide member and the stator housing, the rotor shaft moveable with respect to the guide member between a retracted position corresponding to a first drilling depth and an extended position corresponding to a second drilling depth;

a locking plate coupled to the stator housing and providing a first engagement portion adjacent the bottom sub and a second engagement portion adjacent the guide member; and

a drive dog coupled to the second end of the rotor shaft, the drive dog engaging the first engagement portion when the rotor shaft is in the retracted position by rotational movement of the drive dog with respect to the first engagement portion and engaging the second engagement portion when the rotor shaft is in the extended position by rotational movement of the drive dog with respect to the second engagement portion, engagement between the drive dog and the first and second engagement portions transmitting rotational movement from the rotor shaft to the stator housing.

9. The telescoping sub assembly of claim 8, further comprising a first detent assembly coupled to the stator housing adjacent the bottom sub, and a second detent assembly coupled to the stator housing adjacent the guide member, the first detent assembly detently engaging the drive dog when the rotor shaft is in the retracted position, and the second detent assembly detently engaging the drive dog when the rotor shaft is in the extended position.

10. The telescoping sub assembly of claim 9, wherein the detent assemblies each include a biasing member and a detent member, and the drive dog defines a detent recess, wherein when the rotor shaft is in the retracted position the detent member of the first detent assembly is biased into engagement with the detent recess, and wherein when the rotor shaft is in the extended position the detent member of the second detent assembly is biased into engagement with the detent recess.

11. A method for drilling a hole in the ground with a drilling rig, the drilling rig including a tower and a drill head that is moveable along the tower, the method comprising:

providing a telescoping sub assembly including a rotor portion and a stator portion, the sub assembly being adjustable between a retracted configuration and an extended configuration;

coupling one end of the telescoping sub to the drill head;

coupling an opposite end of the telescoping sub to a drill rod, thereby defining a drill string;

operating the drilling rig to drill to a first depth;

upon reaching the first depth, operating the drilling rig to adjust the telescoping sub assembly from the retracted configuration to the extended configuration, including rotating the rotor portion with respect to the stator portion to disengage the rotor portion from the stator portion and rotating the rotor portion with respect to the stator portion to re-engage the rotor portion with the stator portion at a different relative axial position of the rotor portion with respect to the stator portion; and

with the telescoping sub assembly in the extended configuration, operating the drilling rig to drill to a second depth that is greater than the first depth.

12. The method of claim 11, wherein operating the drilling rig to drill to a first depth includes rotating the drill string in a drilling direction, and moving the drill head along the tower to urge the drill string into the ground.

13. The method of claim 12, wherein rotating the drill string includes rotating the drill head.

14. The method of claim 12, wherein rotating the drill string includes rotating a kelly bushing that is rotatably fixed and axially moveable with respect to the drill string.

15. The method of claim 11, wherein coupling an opposite end of the telescoping sub to the drill rod includes coupling a stator portion of the telescoping sub to the drill rod.

16. The method of claim 15, wherein coupling one end of the telescoping sub to the drill head includes coupling a rotor portion of the telescoping sub to the drill head.

17. The method of claim 16, wherein operating the drilling rig to adjust the telescoping sub assembly from the retracted configuration to the extended configuration comprises:

rotatably fixing the stator portion;

rotating the rotor portion in a first direction with respect to the stator portion, thereby rotatably disengaging the rotor portion from the stator portion;

moving the rotor portion axially with respect to the stator portion from the retracted configuration to the extended configuration; and

rotating the rotor portion in a second direction with respect to the stator portion, thereby rotatably engaging the rotor portion and the stator portion.

18. The method of claim 17, wherein rotatably disengaging the rotor portion from the stator portion includes overcoming a detent assembly and disengaging a drive dog from an engagement tab.

19. The method of claim 17, wherein rotatably engaging the rotor portion and the stator portion includes overcoming a detent assembly and engaging a drive dog with an engagement tab.

CLAIMS – MANUSCRIPT
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1. A telescoping sub assembly adapted to be coupled between a drill head of a drilling rig and a drill rod, the telescoping sub assembly comprising:

a stator portion coupled to the drill rod and defining a drilling axis;

a rotor portion coupled to the drill head and moveable with respect to the stator portion between a retracted position corresponding to a first drilling depth, and an extended position corresponding to a second drilling depth; and

a locking assembly ~~selectively engaged by at least one of the stator portion and the rotor portion to prohibit relative rotation of the rotor portion with respect to the stator portion when the rotor portion is in the retracted and extended positions~~ releasably engaging the stator portion with the rotor portion in an extended state of the telescoping sub assembly via a first mating engagement between the rotor and stator portions in a first relative axial position of the rotor portion with respect to the stator portion; and

the locking assembly releasably engaging the stator portion with the rotor portion in a retracted state of the telescoping sub assembly via a second mating engagement between the rotor and stator portions in a second relative axial position of the rotor portion with respect to the stator portion;

wherein the stator and rotor portions are releasably engaged with one another at the first and second axial locations by relative rotational movement of the rotor portion with respect to the stator portion at the first and second axial locations, respectively, and wherein such engagement of the stator and rotor portions prohibits further relative rotation of the rotor portion with respect to the stator portion.

2. The telescoping sub assembly of claim 1, further comprising a detent assembly including a first portion coupled to the stator portion and a second portion coupled to the rotor portion, the first and second portions engaging one another when the rotor portion is in the retracted and the extended positions.

3. The telescoping sub assembly of claim 2, wherein the first portion includes a pair of axially spaced detent couplings coupled to the stator portion, and the second portion includes a drive dog coupled to the rotor portion, and wherein when the rotor portion is in the retracted position the drive dog detently engages one of the detent couplings, and when the rotor portion is in the extended position, the drive dog detently engages the other of the detent couplings.

4. The telescoping sub assembly of claim 3, wherein each detent coupling defines a plurality of bores, and each bore receives an axially biased detent pin including an end extending axially beyond the detent coupling, and wherein the drive dog defines a plurality of detent recesses that receive the detent pins when the rotor portion is in the extended and retracted positions.

5. The telescoping sub assembly of claim 1, wherein the locking assembly includes a locking plate coupled to the stator and providing a first engagement portion and a second engagement portion axially spaced from the first engagement portion.

6. The telescoping sub assembly of claim 5, wherein the locking assembly includes a drive dog coupled to the rotor portion, the drive dog engaging the first engagement portion when the rotor portion is in the retracted position, and engaging the second engagement portion when the rotor portion is in the extended position, and wherein engagement between the drive dog and the first and second engagement portions transmits rotation from the rotor portion to the stator portion.

7. The telescoping sub assembly of claim 5, wherein the stator portion receives at least a portion of the rotor portion, and wherein the locking plate is received within an annular space defined between the stator portion and the rotor portion.

8. A telescoping sub assembly adapted to be coupled between a drill head of a drilling rig and a drill rod, the telescoping sub assembly comprising:

a generally cylindrical stator housing defining a drilling axis;

a bottom sub coupled to an end of the stator housing and adapted to be coupled to the drill rod;

a generally cylindrical guide member coupled to an opposite end of the stator housing;

a rotor shaft having a first end adapted to be coupled to the drill head, and a second end that is received by the guide member and the stator housing, the rotor shaft moveable with respect to the guide member between a retracted position corresponding to a first drilling depth and an extended position corresponding to a second drilling depth;

a locking plate coupled to the stator housing and providing a first engagement portion adjacent the bottom sub and a second engagement portion adjacent the guide member; and

a drive dog coupled to the second end of the rotor shaft, the drive dog engaging the first engagement portion when the rotor ~~portion~~ shaft is in the retracted position by rotational movement of the drive dog with respect to the first engagement portion and engaging the second engagement portion when the rotor ~~portion~~ shaft is in the extended position by rotational movement of the drive dog with respect to the second engagement portion, engagement between the drive dog and the first and second engagement portions transmitting rotational movement from the rotor shaft to the stator housing.

9. The telescoping sub assembly of claim 8, further comprising a first detent assembly coupled to the stator housing adjacent the bottom sub, and a second detent assembly coupled to the stator housing adjacent the guide member, the first detent assembly detently engaging the drive dog when the rotor shaft is in the retracted position, and the second detent assembly detently engaging the drive dog when the rotor shaft is in the extended position.

10. The telescoping sub assembly of claim 9, wherein the detent assemblies each include a biasing member and a detent member, and the drive dog defines a detent recess, wherein when the rotor shaft is in the retracted position the detent member of the first detent assembly is biased into engagement with the detent recess, and wherein when the rotor shaft is in the extended position the detent member of the second detent assembly is biased into engagement with the detent recess.

11. A method for drilling a hole in the ground with a drilling rig, the drilling rig including a tower and a drill head that is moveable along the tower, the method comprising:

providing a telescoping sub assembly ~~that is~~ including a rotor portion and a stator portion, the sub assembly being adjustable between a retracted configuration and an extended configuration;

coupling one end of the telescoping sub to the drill head;

coupling an opposite end of the telescoping sub to a drill rod, thereby defining a drill string;

operating the drilling rig to drill to a first depth;

upon reaching the first depth, operating the drilling rig to adjust the telescoping sub assembly from the retracted configuration to the extended configuration, including rotating the rotor portion with respect to the stator portion to disengage the rotor portion from the stator portion and rotating the rotor portion with respect to the stator portion to re-engage the rotor portion with the stator portion at a different relative axial position of the rotor portion with respect to the stator portion; and

with the telescoping sub assembly in the extended configuration, operating the drilling rig to drill to a second depth that is greater than the first depth.

12. The method of claim 11, wherein operating the drilling rig to drill to a first depth includes rotating the drill string in a drilling direction, and moving the drill head along the tower to urge the drill string into the ground.

13. The method of claim 12, wherein rotating the drill string includes rotating the drill head.

14. The method of claim 12, wherein rotating the drill string includes rotating a kelly bushing that is rotatably fixed and axially moveable with respect to the drill string.

15. The method of claim 11, wherein coupling an opposite end of the telescoping sub to the drill rod includes coupling a stator portion of the telescoping sub to the drill rod.

16. The method of claim 15, wherein coupling one end of the telescoping sub to the drill head includes coupling a rotor portion of the telescoping sub to the drill head.

17. The method of claim 16, wherein operating the drilling rig to adjust the telescoping sub assembly from the retracted configuration to the extended configuration comprises:

rotatably fixing the stator portion;

rotating the rotor portion in a first direction with respect to the stator portion, thereby rotatably disengaging the rotor portion from the stator portion;

moving the rotor portion axially with respect to the stator portion from the retracted configuration to the extended configuration; and

rotating the rotor portion in a second direction with respect to the stator portion, thereby rotatably engaging the rotor portion and the stator portion.

18. The method of claim 17, wherein rotatably disengaging the rotor portion from the stator portion includes overcoming a detent assembly and disengaging a drive dog from an engagement tab.

19. The method of claim 17, wherein rotatably engaging the rotor portion and the stator portion includes overcoming a detent assembly and engaging a drive dog with an engagement tab.